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ITS PLACE IN THERAPEUTICS: WITH CASES
TREATED.



WALLIAN.



REPRINTED FROM THE PHYSICIAN'S MAGAZINE, PHILADELPHIA, AND
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Please notice

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FURTHER REPORT ON OXYGEN: WITH CASES TREATED;

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THE MEDICAL RECORD, NEW YORK,

—BY—

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Medical Association, Etc., Etc.

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OXYGEN: A RATIONAL STUDY OF ITS PLACE IN THERAPEUTICS.

BY SAMUEL S. WALLIAN, A. M., M. D., BLOOMINGDALE, N. Y.

THE time has come, in the history of medicine, when every therapeutic claim, every honest endeavor to abridge or ameliorate human suffering, add comfort to the days and length to the years of human life, is accorded a respectful hearing, and is finally judged on its absolute merits. This is true, even to the impartial and unprejudiced investigation of the scores of popular isms and ephemeral pathies which every decade brings frothing to the surface.

Throughout the medical world analysis, speculation and research are active and eager for new light. Routine methods and antiquated theories, which have only popular prestige and venerable antiquity to sustain them, are no longer competent to satisfy thinking minds. Our foremost writers, teachers and investigators have begun to insist on reasonable data for every assumption. They refuse longer to rest their medical faith on dogmatic assertion and time-honored tradition, insisting that medicine, mystery and superstition have long enough been in vogue as synonymous terms.

Heretofore the study of medicine has involved and required, chiefly, a process of memorization—cramming—and the cultivation of an aptitude for implicit belief. Now it requires that its devotees shall investigate, criticise and think.

Diseases are no longer looked upon and superstitiously dreaded as evil spirits, roaming at will over the face of the earth, seeking what luckless victims they may devour; and only the inexcusably ignorant still attempt to exorcise them by philters and mummery.

The one unrelenting search of the day is for a key to the true nature of disease, and for remedies which do no violence to natural laws, which do not contravene physiological action by substituting one condition for another, and assuming that since it is a change it is a cure. Hence the imminent and irrepressible conflict in the medical field is not one of strained ethics, but lies between natural, as opposed to applied or artificial therapeutics. In these later days, every society meeting and medical congress brings to the front new knights to champion fresher ideas, and to pierce the armor of established errors, already everywhere losing deference and tottling to their fall.

In view of the chaotic incongruity of pseudo-science and the jargon of learned superstition, enshrined in all the text books, taught in all the schools and revered by a vast majority of the human race, we must needs ask what resource is left to the conscientious student of medicine who is unwilling to stay in the rut, to dole out, by set rule, the routine remedies, and to strive in vain to appease his scientific hungering with the husks of hypothesis?

We all realize how sadly we have limped in the race with the sister arts.

Astronomy has wrenched from the heavens their profoundest secrets, and brought to our view the remotest mysteries of chaotic space. In commerce and the industrial arts, progress and perfection are the order of the day. Space and time have been annihilated in the flash of the harnessed lightning; the electro-scientist now discounts the labor of the historian by treasuring and reproducing the very voices of the dead, and repeating the music of one age and generation in the ears of the next; microscopy has well-nigh revealed the original mystery of creative energy; law has a basis of system; theology boasts a definite plan; painting and sculpture are guided by fixed rules, and all the natural sciences have constantly advanced toward absolute precision and mathematical certainty; while the logical claims of assumed medical science are no more substantial and no less hypothetical than in the days of Paracelsian dogmatism and pompousness.

Medical skepticism of a rather healthy and conservative sort, is daily and yearly increasing, and standard text-books on materia medica and therapeutics are coming to be looked upon as indexed museums of medical curiosities. The list of reputed remedies ostensibly multiplies, but new claimants are received with incredulity, and the pharmacopœia is being so rapidly and mercilessly culled of its rubbish that even well-poised medical minds begin to query whether it will be long before the whole endless category of drug-medicines, with a few rare exceptions, will be unceremoniously kicked into the sea.

Yet, surrender what we will of art, even though all the arts become Lost Arts, yet nothing is lost. Every atomical integer of creation, ponderable or imponderable, solid or fluid, every law and force and attribute remains. When we substitute a fetich for a fact nothing is endangered.

So we may cherish an ideal instead, let the idols go. The sun, and moon, and stars, and earth, and air remain; more we never had.

For still abideth these three; earth, air, and water; but the greatest of these is *air*, for lo! it makes all the rest possible; is of

them and ever about them; and without it was not anything made that was made. This, is *Oxygen*, the primal source through which man became and continues to be a living soul; the kindly and sustaining medium in which he is forever bathed, at all times his inestimable friend, and at last his relentless destroyer; indispensable boon and unerring besom; blandest at once and most potent of all the forms of matter—the veritable *anima* of Stahl.

Wherefore the straws of logic and prophecy all point to this, as the ultimatum of physiology:

From the same agencies and elements which nourish, encompass and sustain us, in health, must we at last seek remedies through which to recover lost physical status.

In this direction what have we accomplished? Earth has been analyzed, volatilized, subtilized; dissociated, isolated, combined and recombined; and the apothecary's shelves groan with their labeled loads of it. Water has been utilized, abused and refused, in almost every form of human ailment. Its uses and availability are next to limitless, altogether indispensable, and not yet half appreciated.

Of oxygen as a commonplace medium of respiration, submersion and transmission, we have conned a few trite aphorisms. Of its resources for repair and restoration we go on, age after age, almost criminally ignorant. Not that it has not been studied in the light of a therapeutic agent, in the past, to some extent, but that stilted misconceptions of its normal effects have been permitted to blind us to its real capabilities, and to keep it for a full century in the background.

As early as 1772, Marching Poullé, of Montpellier, and in 1774, Girtanner and Stoll, of Germany, attempted the use of oxygen gas in the treatment of diseases, with what results does not appear. The first reported case, of which any definite record remains, in which this agent was used, was treated by Caillens, in 1783. In the following year, Jurine, of Geneva, published a short essay on the subject, and reported a case of phthisis in a young lady, very much benefited by oxygen.

The next record is by Chaptal, of Montpellier, who, in 1789, reported two cases of phthisis, treated by the same agent, in one of which marked relief was obtained, while in the other the results were negative.

To Beddoes, more than to any other, belongs the credit of having called the attention of the profession in England to the medical use of the gas. His experiments were conducted on an extensive scale and with a perseverance and enthusiasm worthy of a more practical success and better recognition than he secured.

For a history, in detail, of these and later experiments consult a prize essay read before the Alumni Association of the College of Physicians and Surgeons, New York, 1870, by Dr. A. H. Smith.

Other names occurring in connection with early experiments with the gas as a remedy, are those of Priestley, its co-discoverer, Lavoisier, Barthollet, Spallanzani, Thornton, Hill, Cavallo, Erichsen, Demarquay, and others. Sir Humphry Davy also materially assisted Beddoes in his chemical manipulations. The latter was a practitioner of note, and also professor of chemistry at Oxford.

Considering the extremely crude state of chemical knowledge prevailing, at the time, it is fairly remarkable that any encouraging results were attained. To illustrate, Beddoes and his confrères procured their gas from an oxide of mercury, through what would now be deemed a crude and bungling process. The purification of the gas was so imperfectly accomplished that in some instances ptyalism ensued, and the treatment had to be suspended to prevent mercurial poisoning!

The methods of exhibiting the remedy were also very imperfect, the patients being caused to remain for some time in closed rooms, the atmosphere of which had been previously impregnated with the desired gas. Thus the sufferer was caused to sit in and inhale an atmosphere, which, already tainted by an impure gas, was being constantly further contaminated by his own, perhaps fetid, exhalations, and having no way by which it could be definitely regulated or renewed.

Among the gases tried, both by inhalation and by cutaneous absorption—gas-baths—were oxygen, hydrogen, nitrogen, carbonic acid, nitrous oxide, and some others.

After the discovery of the peroxide of hydrogen, in 1818, by Thenard, this member of the oxygen group was added to the list for experimental test in medicine. Of all the agents tried, none gave promise of positive remedial value, except oxygen, nitrous oxide and the peroxide of hydrogen.

Like all new agencies when first announced, oxygen was over-lauded in the outset, the reports of cures effected partaking so largely of the marvellous as to be generally discredited. By its few advocates it was extolled as a panacea for all the ills of humanity; while the many passed it by as only the newest candidate for ephemeral fame. Distrust of the agent and derision of its manipulators were alike universal and utterly unreasonable.

But this was in nowise an exceptional experience. All the natural, and therefore common agencies, when urged in therapeutics, have

met with a similar reception and failed of better recognition. Hydrotherapy and Galvanism have waited half a century to be lifted out of the domain of quackery (where they never belonged), and are not yet universally admitted into the guarded circle of legitimate therapeutics. It would seem that the human mind—even the medical mind!—is sometimes inclined to value aid chiefly in proportion to its far-fetched unnaturalness.

The influence of diet over development, as well as in the causation and removal of disease, is yet but half known; and who is not tired of the movement - cure - gymnastic - health - lift - jolting - chair din? Even dumb-bells have had to be made "electric" in order to prop them in popular favor.

So of oxygen. It is too common. Do we not breathe it all the time, and is it not everywhere, in unvarying proportions, in spite of us? Yet who of our astute investigators, gloating over each new tint for staining a possible bacillus, and strutting in the prints if he have brought out a new glucoside, has given to the study of oxygen a tithe of the time he has spent in bothering about spectral polarization, or the proper method of enucleating the dislocated vitreous of some pink-eyed rabbit or sniveling guinea pig!

Of the process of respiration, we barely remember to have been told that when the average man takes a full inspiration, he has distended his lungs with about 175 cubic inches of atmospheric air, consisting of about 140 parts nitrogen, and 35 of oxygen. Something the books add, in a dogmatic way, about chemical blood-changes, the burning up of nitrogenous waste, and the conversion of hydro-carbons into heat. Thus, oxygen, that sole element in which all other elements, even diamond itself, are consumed with fervent heat, the essential principle of all life, is degraded into a mere mechanical motor—the steam generator of the vital organism!

Looking more closely into the nature and composition of this theoretically tasteless, odorless and impalpable fluid, it is now conceded that the oxygen of the atmosphere, its atoms pushed asunder and probably modified by the interposed nitrogen, exists in a peculiarly quiescent state: that the atmosphere at all times contains appreciable quantities of aqueous vapor, carbonic acid and ammonia, also traces of ozone and peroxide of hydrogen, the two latter being frequently confounded and mistaken, one for the other.

These may be termed normal, since they are almost constant constituents of respirable air. Some of them vary greatly in proportion, in

different localities ; and it is chiefly these variations which render one locality or climate more or less salubrious and invigorating than another.

In addition to these, either useful or practically harmless, constituents, we must also make allowance for numerous accidental or factitious impurities—dust, animal emanations, noxious gases from decomposing matter, from manufactories and chemical workshops, smoke, and in the present temper of microscopic pathology, especially must we concede importance, as ætiological factors in the causation of certain classes of diseases, to floating germs, spores, and a certain invisible and elusive something, the practical sequel of which is contagium.

Estimating that the average adult, in ordinary health breathes twenty times per minute, and that 100 cubic inches of air is inspired at each effort, it will require, in round numbers, 12,500 gallons of air to supply each pair of lungs during twenty-four hours. Of this quantity, 2,500 gallons is oxygen. Omitting all consideration of the neutral diluent, nitrogen, as having—possibly—no practical bearing, it thus requires 100 gallons of pure oxygen, per hour, to maintain a human adult organism in healthy relations.

Considering the thousand-and-one sources of contamination, the interference of occupations necessitating cramped bodily positions, unavoidable climatic vicissitudes, noxious local surroundings, the impossibility of perfect ventilation, even in our most elaborate dwellings, the confining character of the daily occupations to which a majority of the race must submit, thus making it utterly impossible to secure anything like normal air to breathe, it is safe to assume that the average actual consumption of oxygen is not more than one-half this estimated requirement. It follows that the pathologist who attributes a majority of all modern diseases to a veritable *anhæmatis*, or, in plainer phraseology, semi-asphyxia, has fact, physiology and logic all contributing to sustain his assumption.

Human beings, therefore, especially in civilized life—the ratio alas ! increasing exactly in proportion to the degree of civilization—either voluntarily submit to or are compelled by circumstances over which they have little or no control, to suffer vital robbery to this extent. True, Nature, ever on the alert for compensatory substitutes and conservative reparation, does her best in many ways to render this deprivation comparatively harmless ; but as constant trickling finally splits in twain mountains of adamant, so this physiologic deprivation so steadily persisted in day by day, at last makes its inroads. The starved blood

falters, the robbed nerves cry out, tissue changes flag for want of material, or the tissues themselves degenerate, until disorganization in one or another of its fatal forms, is finally inaugurated. Anæmia, neuralgia, dyspepsia, diabetes, albuminuria, scrofula, tuberculosis—these are the milestones on the downward road, the direct or indirect results of imperfect oxygenation, the *misère physiologique* of Bouchardat.

It may be asked, does not this ignore the prevailing germ theory as relates to the ætiology of certain diseases? Not at all. Pasteur and others have taught us that the bacillus of anthrax, as well as other germs, are soon robbed of their virulence by cultivation in fluids freely exposed to the oxygen of the air; and that while they are not strictly anærobic, anything more than a very limited supply of oxygen cripples and eventually kills them. In other words, the origin and multiplication of these germs is made possible only through definite *deprivation of oxygen*, and thorough oxygenation transmutes a favorable culture fluid into a lethiferous menstruum.

But to touch on another point, as yet scarcely hinted. Dr. Birch, of the Manchester Medical School, who published an interesting work on the subject in 1858, asserted that oxygen as evolved by chemic art is in a *nascent*, allotropic or *actinic* state, and hence, in its degree of activity, quite distinct from the quiescent oxygen of the common atmosphere. Whether this be due to minute traces of ozone, always present in factitious oxygen; or to some occult molecular differential too subtle to be detected, not to say described, cannot now be determined. Fifteen years of clinical experimentation has fully convinced me of the truth of this assumption; but I cannot appreciate the further vagaries as to "polarization," "motive power," "heat," etc., indulged in by the same author.

It is, then, futile to reason of the potency of oxygen set free in the alembic of the chemist by the action of that found in common air.

Those who have watched the prompt and delicate effects of nascent chloride of ammonium, as evolved in a cloud of microscopic snow crystals, through a properly prepared inhaler (say Cutter's), as compared with the old and crude method of heating the salt to vaporization over a common lamp, are fully prepared to appreciate this statement. It is, in a word, actinic oxygen, akin to, if not always combined with, ozone.

It proves itself a prompt parasiticide, a powerful disinfectant and deodorizer. Very few forms of microzoic life can withstand it, for, like its *alter ego*, ozone, it is not only a potent germicide, but is also a reliable sporicide. All material substances, all forms of organic matter

permeable to any form of contamination, infection or contagium, are alike permeable to oxygen. The latter unerringly seeks out morbid germs, and robs them of their virulence, or mercilessly strangles them ere they have had time to colonize, multiply and initiate destructive processes or accomplish fatal lesions in any fostering nidus.

Is it then wonderful that in this element so common as to be almost vulgar, we have, if we know how to adapt it, one of our most potent weapons in the warfare upon disease, and especially in combating all that large and important class of chronic ailments, which are a direct result of its own chronic, physiologic insufficiency?

The whole vexed subject of climatology resolves itself into a study of atmospheres; and these are good, bad or indifferent exactly in proportion as they afford the vital element in question, free from contaminations, *or as they contain traces of ozone, or peroxide of hydrogen.*

In passing upon any climate or locality, either as a desirable place of residence or as a resort for invalids, the first question to be decided is whether the atmosphere is comparatively free from hurtful emanations, "malaria," noisome odors, floating germs or injurious vapors. The next question should be to determine the appreciable presence or marked absence of these essentials, modifying but generally ignored constituents which vary greatly as to quantity at different times and in different localities.

The rush to Europe, the numerous watering places, and the mountains, is essentially an unconscious hunt for more oxygen, or for less contaminated and more available oxygen.

The sea voyage is another search for oxygen—ozone, uncontaminated air. What is there in the brackish salts held in solution by sea-water to be of service to the debilitated invalid? One can easily fabricate more agreeable and really more beneficial mixtures on land. The bracing sniff of salt sea breeze, so celebrated in poetry, is merely a grateful sniff of purer air tinctured with revivifying traces of peroxide of hydrogen and ozone—*oxygen.*

It is not the aim of this paper to elucidate details of methods, or to give reports of cases treated, and results accomplished. This has been done in previous papers read before medical societies and published in various medical journals, chiefly the *Medical Record*, some of which have been issued as reprints; to these the interested reader is referred for *pro forma* evidence.

In the publications referred to, some illustrations are given of simple and limited apparatus, for office use, in preparing and dispensing the gases.

As the treatment is evidently on the threshold of an active revival, *and soon to be rescued from the custody of mercenary quacks*, a more elaborate arrangement, for general office use, has come into demand. The accompanying sketch illustrates the writer's model of a four-meter cabinet, with compact laboratory combined, for general office use. The form may be varied to suit the needs and convenience of each practitioner. It may be made highly ornamental or comparatively inexpensive, according to taste and means. Curtains of any suitable material, if desired, are to be suspended by sliding rings over a bar at the top, so that the whole may be neatly enclosed when not in use. They are omitted in the cut in order better to illustrate the working parts.

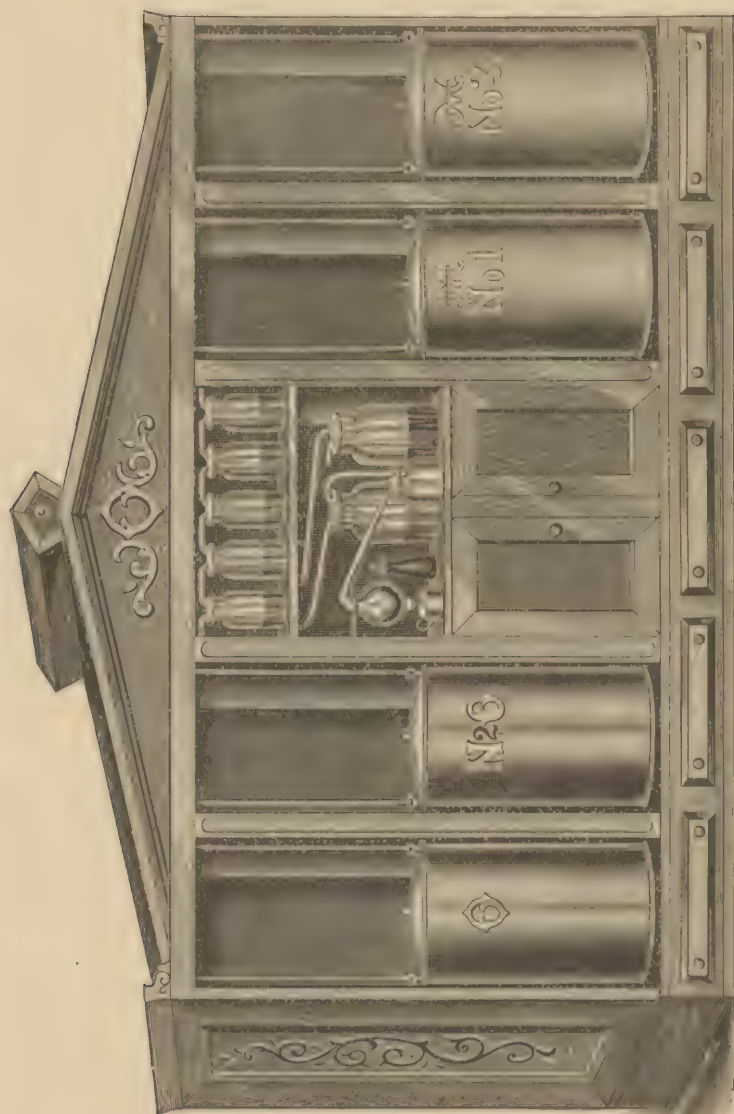
The principle of pneumatic differentiation, lately brought freshly to notice by Dr. Williams, of Brooklyn, Dr. Bowditch, of Boston, Dr. Houghton, of Chicago, and others, benefit their patients as much, perhaps, by the increased quantity of oxygen insured as by the mechanical effects induced. It can be made a valuable adjunct in the use of oxygen. The latter may be compressed to any degree desired, and by very simple and comparatively inexpensive additions to the usual apparatus, patients may be caused to inspire compressed gas, and expire into a partially exhausted receiver. Thus the principal effects of the differentiation treatment can be, at least in a measure, secured without recourse to the cumbersome and expensive chamber required for Dr. Williams' process.

The pressure-ratio between the fluid inspired and the surrounding atmosphere can be regulated without recourse to very expensive apparatus.

Plans for combining this idea with that of the ordinary use of oxygen, etc., are now being developed and the results will be announced in the near future. Various unique designs for office cabinets are also being perfected.

From its nature, for the present, and perhaps for some time to come, the treatment will unquestionably and necessarily remain principally in the hands of the few practitioners who will, regardless of time or expense, devote sufficient energy and attention to it to make it realize the widest success of which it is capable. The day will evidently come, although yet far off, when our manufacturing chemists will supply us with some easier, less cumbersome and more economical methods of procuring and exhibiting the agents under consideration.

It is only necessary to consider rightly its nature, ignoring all specious claims and enthusiastic over-coloring, in order to infer the wide range of adaptability and applicability of the treatment. Without



Four Meter Oxygen Cabinet For Office Use.—Author's Design.

exaggeration, it is almost unlimited. Oxygenation is as essential to life and health as alimentation. No sane therapist asks, in what conditions and diseases is it proper to nourish his patient! And super-oxygenation is as logically and naturally indicated—fairly in fact, self-suggesting—to overcome the diseases which result from deficient oxygenation, as alimentation to revive and restore the starved survivors of the Greeley Expedition! This rule or indication is simple and definite, and covers the subject better than pages of hypothesis, or whole volumes of pathological finesse.

While its range is practically unlimited, the fields in which greatest triumphs have thus far been achieved are in the direction of the *indigestions, asthma, phthisis, tubercular and fatty degenerations* of every kind, *neuralgia, neurasthenia, anæmia, insomnia, scrofula, glandular enlargements*, and, in short, in all chronic diseases dependent on *deficient, perverted or morbid assimilation*. Thus, among the many inveterate forms already made to succumb, or decidedly ameliorated by the treatment, may be named, in particular, *epilepsy, eczema, phthisis*, both fibroid and catarrhal, *locomotor ataxia, sciatica, chronic pelvic cellulitis*, with intra-pelvic abscess, *cardiac troubles* of various kinds, severe *chronic constipation, insomnia and impotence*.

The time required for definite and satisfactory results necessarily depends on the nature and age of the cases. The curative process is not always attended by brilliant immediate results, but is often quite slowly inaugurated. It is, however, usually so thorough and permanent that in the end there is no complaint on this score. Hence, chronic cases should be treated by the month or term, while no desultory "trying it for a week or two" should be encouraged or tolerated.

A marked feature in many cases is that, after a course of systematic oxygen treatment, the benefits realized perceptibly continue, as if seemingly cumulative, long after active treatment has been suspended. Patients have thus been observed to *gain as steadily for three or six months after omitting the treatment* as while regularly following it.

It must be observed, and the fact should be emphasized, that this remedy or group of remedies, which includes several oxygen congeners, themselves efficient and important synergists to oxygen itself—is not urged as a panacea. It should be made no more prominent than it evidently is by virtue of its own nature, *viz.*, the most potent and available of all the natural and thoroughly scientific agencies for the removal of diseased conditions. And yet in connection with it no rational or available adjuvant is to be neglected. Leave exclusivism to the charlatans.

This element, oxygen, at once so wonderful and so indispensable to every organized being, yet so common as to be the least appreciated of all the elements, has been much studied by scientists as to its chemical and mechanical significance, and also to some extent, as to its physiological relations; but it is only quite recently that any considerable interest has been revived in its evidently immense value as a therapeutic agent. In this respect American genius, for a wonder, has lagged, and allowed French, English, German and even Italian and Russian enterprise to take the lead in a study which is neither abstruse nor uninteresting.

Among others, the following authorities and fugitive papers may be cited :

Birch, "On Oxygen," London, 1858; Demarquay, "Reports to the Academy of Medicine," Paris, 1863; Idem, "*Gazette Medicale*," Paris, 1865; Smith, A. H., "Oxygen Gas as a Remedy in Disease," Prize Essay, New York, 1870; Laudolt "On the Use of Peroxide of Hydrogen in Ophthalmic Practice," London *Med. Record*, March, 1883, by the writer, "Oxygen and Some of Its Compounds as Therapeutic Agents," *Med. Record*, N. Y., 1883, vol. 24, pp. 455-457, and pp. 513-515; and by the same, "On the Preparation and Use of Oxygen and Congeners as Remedial Agents," *Med. Record*, N. Y., 1884, vol. 26, pp. 283-287; and pp. 313-316 Nunn, R. J., "Peroxide of Hydrogen in Diphtheria," Savannah, Ga., 1884; by the writer, "An Old Remedy Revived," Transactions Vermont State Medical Society, Montpelier, 1884; Idem, "Hydrogen Dioxide," paper read before the New York State Medical Society, February, 1885; Dayton, W. A., "Peroxide of Hydrogen in Purulent Otitis," etc., *N. Y. Med. Journal*, April 28, 1885; and by the writer, "Further Report on Oxygen as a Therapeutic Agent," *Med. Record*, N. Y. October 31, 1885 vol. 28, pp. 483-488.

FURTHER REPORT ON OXYGEN AS A THERAPEUTIC AGENT.*

BY SAMUEL S. WALLIAN, A. M., M. D., BLOOMINGDALE, N. Y.

IN again reverting to a subject upon which I have already written several addresses and journal articles, no apology is necessary, since I am a confirmed believer in, and the prevailing temper of the profession generously tolerates, if it does not boldly encourage, special lines of medical inquiry. It is by confining our chief efforts to a single subject of investigation that each is enabled to contribute valuable results to the general stock of professional knowledge.

Since the publication of my first paper upon this subject, I have further pursued the study of the therapeutic possibilities of oxygen and its congeners, have received hundreds of letters of inquiry from practitioners in various parts of the country, some of whom have impulsively sent me incorrigible cases for treatment, without previous notice or any understanding whatever. Such ill-advised haste is unfair to the treatment, and sometimes embarrassing to the practitioner, who prefers to use discretion and some degree of professional conscientiousness in selecting his cases.

I have also published several articles in the *Medical Record* and elsewhere, some of which have been reprinted in pamphlet form, and may be had on application.

Papers and reports bearing upon this subject, have also, from time to time, appeared in various foreign as well as American medical journals.

Loyssel, in the *Journal de Médecine de Bruxelles*, August, 1884, reports results of extensive experiments with the pure gas. During the year I have received a copy of a work published in 1870, at Calcutta, by J. E. Purdon, Staff Assistant Surgeon in the English Army operating in the Indies. It is a quaintly printed octavo of 120 pages, entitled "Cholera; and Efforts toward Framing an Equilibrium Theory of Disease."

Dr. Purdon labors with really ingenious plausibility to show that oxygen, and its actinic state, ozone, by their presence or absence are

* Reprinted from the *Medical Record*, October 31, 1885.

important, if not principal factors in the origin, dissemination, and antagonism of cholera and other epidemic and zymotic diseases.

Loyssel, in the paper referred to, formulates the following conclusions :

1. In certain cases of poisoning, viz., by chloroform, ether, chloral, opium, sulphide of hydrogen, carbonic oxide and hydrocyanic acid, oxygen is the only means of preserving life after all other means have failed.

2. Its presence in the operating room would be an infallible safeguard against fatal accidents from the use of anæsthetics. It promptly restores sensibility and eliminates narcosis in all such cases.

3. It offers the best prospects for success in asphyxia from strangulation, drowning, poisonous gases, etc., as also in cases of suspended vitality in the new-born.

4. It will almost surely sustain life in all cases in which respiration has not entirely ceased, even if the intervals between inspirations be very great, provided it be persistently exhibited.

5. If cardiac and respiratory action have been absent for but a short time, resuscitation is often possible through the use of oxygen; and this agent should be perseveringly used in all such cases, even when appearances indicate that all efforts will prove useless. Cases have been frequently reported of drowned persons and apparently still-born children being fairly raised from the dead by persistent endeavors with oxygen.

6. There is no contra-indication of the gas in any case of asphyxia.

7. The gas can be respired in notable quantities without the slightest injury.

Dr. Holstein, in the *Gazette Médicale de Paris*, asserts that oxygen has marked power in enfeebling or inhibiting exaggerated reflexes.

Professor Lashkevitch, of St. Petersburg, reiterates this assertion, and at his suggestion, Dr. Favr, of Kharkov (reported in *Vratch*, No. 13, 1885), resorted to oxygen inhalations in two cases of puerperal eclampsia, and his efforts were followed by prompt and brilliant results.

The first was that of a seamstress, aged nineteen, who was brought to the hospital in an unconscious state, cyanotic, with stertorous breathing, the convulsive paroxysms being very frequent, and each preceded by a uterine contraction. Warm baths, wet packings, and enemata had been thoroughly tried without affording any relief. Chloral hydrate failed to mitigate the paroxysms, and even chloroform inhalations gave but slight and transient relief. Oxygen was then resorted to

as a forlorn hope. Within five minutes from the first inhalation of the gas the patient recovered consciousness sufficiently to call for a glass of water, the pulse fell from 120 to 90 per minute, and a tranquil sleep of two hours' duration intervened. At the end of this period, uterine contraction recurred, without exciting an eclamptic seizure; but on suspending the oxygen inhalation, the paroxysms soon returned. A fresh supply of the remedy brought each paroxysm to a speedy termination, and quiet sleep followed each resumption of oxygen inhalation. At this juncture, the os being not yet dilated, Barnes' dilators were used, the membranes punctured, and the delivery completed without further accident. The patient was discharged on the nineteenth day after confinement, in a very comfortable condition.

The second patient, a primipara, aged eighteen, had two paroxysms of eclampsia, *post partum*, twenty minutes apart, and lasting twelve minutes each, the patient remaining unconscious in the interval. On the administration of oxygen, consciousness at once returned. Four more paroxysms followed, but they were very much milder, and separated by intervals of entire consciousness and perfect comfort. This patient made a rapid and satisfactory recovery.

Dr. Favr concludes his paper by expressing his enthusiastic hope that further tests will so corroborate these results that, in the near future, oxygen-gasometers will become a common and indispensable feature of all lying-in hospitals.

Among the newer preparations brought forward, recently, as related to the oxygen family, Professor Beek stands godfather to one called by the rather questionable name, *Ozonine*. It is a liquid, depending wholly upon ozone, or actinic oxygen, for its medicinal virtues, and was recently discussed at a meeting of the Biological Society of Paris (*Repertoire de Pharmacie et Journal de Chimie Medicale*, **1**, 1885).

Of this preparation—the details of its manufacture not being given—Onimus, of Paris, declares that as a disinfectant it is scarcely less prompt or efficient than ozone in a gaseous state.

Brand, of Toulon, used this drug with marked success in small-pox and in cholera.

Griol and Long assert that for putrid and zymotic diseases and conditions, in hospital practice, this preparation, by constantly liberating ozone, affords to nurses, physicians, and attendants, certain and safe immunity from infection.

Its application to flesh in an advanced state of decomposition, and

to putrid eggs, promptly corrected all odor and appearance of putrefaction.

It blackens metallic silver, changes arsenite of potash into arseniate, and gives the usual reactions of ozone with the test-papers of Schönbein and Honzeau, as also with thallium paper.

Thus, as an antiseptic, antizymotic, antiputrefactive, and disinfectant, this preparation may, in time, supersede the entire list now in use.

Following in the wake of the above, a Boston firm has offered a preparation called *ozone water* (*Aqua Ozonta conc.*), which is claimed to be an efficient form in which to exhibit ozone, both as a disinfectant and for internal administration. Although I have used this article to some extent it has not met my expectations; but my experience with it does not warrant any intelligent or final decision as to its merits.

Of *hydrogen dioxide*, H_2O_2 , commonly called peroxide of hydrogen, and by some inaptly called "oxygenated water," I have spoken in former papers. Among recent experimenters with this compound, Hensel, a German chemist of note, has given it careful study, and has published the results in a brochure which has been translated into English by Professor W. A. Dayton, assisted by Mr. Paul Treutler, of New York. The translation has not yet appeared in print, but it is to be hoped it will ere long be rendered available to the American profession.

According to the interesting table of Professor Miguel, peroxide of hydrogen stands third on the list, as to potency in preventing putrefaction, the binoxide of mercury and iodide of silver alone excelling it in this direction. Since it is entirely non-irritant, non-toxic, and almost as bland in use as simple water, it ought to supplant all the toxic and irritant agents now in use in surgery for the purposes named.

It is also an accurate and reliable test for pus in urine. By adding a solution of the peroxide to the suspected sample, brisk effervescence at once ensues, if pus be present.

Dujardin-Beaumetz has recently given the results of some experiments with this drug, internally exhibited, in cases of severe anorexia, in diabetes mellitus, and in polydipsia. In the first, return of appetite was readily accomplished without causing any gastralgia or other untoward symptoms. In the cases of diabetes, the results were negative. In a case of polydipsia, in which twenty-eight litres of urine were voided daily, the improvement was very prompt.

In the *New York Medical Journal* of April 25, 1885, Dr. Dayton,

whose joint translation of Hensel's work has been referred to, gives a summary of his experiences with peroxide of hydrogen. Having had his attention called to it by Hensel's enthusiastic description of its properties, he essayed its use both topically—chiefly in spray—and internally, in solution, in severe cases of throat, nose and ear disease, "complicated with tubercular infiltration of the lungs." Dr. Dayton concludes his paper, which will well repay perusal by all who are interested in the subject, by asserting, "that the peroxide of hydrogen has a future among the most trusted resources in the materia medica, I have no doubt. It is a potent deodorizer; it is an eligible antiseptic (in [?] and out of the circulation), and it is an effective remedy in a large class of diseases in which mucous membrane tissue is chiefly involved. For cleansing purposes, it has no equal in any known agent. In operations on mucous membrane, where the secretions and hemorrhage often embarrass the surgeon, the use of a strong solution of the peroxide (twelve per cent.) facilitates progress by decolorizing the blood, and by its cleansing, styptic properties."

Dr. F. Allport, of Minneapolis, in a recent number of the *American Journal of Ophthalmology*, gives a strikingly similar report of experiments with this drug, used in the same class of diseases. He, however, evidently writes, as do most recent observers, in utter unconsciousness of work done and reports published by confrères and predecessors; hence encumbering his brief paper with a reiteration of the now somewhat trite history of the original discovery, etc., of the compound.

Certain scientists are now asserting that the immunity from pulmonary and other degenerative diseases, and the general healthfulness enjoyed by those who dwell in the immediate vicinity of pine forests, is largely due to the constant presence of peroxide of hydrogen in the vapor of the atmosphere.

These pine districts have, on the same account, been noticed to have a remarkably beneficial effect on the voice.

Heretofore, it has been the custom to ascribe these effects to ozone

Nitrogen monoxide.—On the therapeutic use of this gas I have received nothing new from foreign sources since the publication of the several papers already referred to. If anything of importance concerning it has appeared, at home or abroad, it has escaped my notice. While its importance as an additional member of the oxygen group cannot be called in question, no one of the foregoing authorities makes the

slightest allusion to this compound, which must eventually be recognized as an essential adjunct to every comprehensive trial of the so-called "oxygen treatment."

This gas is the "nitrous oxide" of the old nomenclature, is more generally known by this name, and is represented by the formula N_2O . It is the basis of the "well-kept secret," for years so successfully vaunted by polished and oily-tongued quacks as "Compound Oxygen;" and, it must be admitted, that in connection with some wholesome hygienic rules persistently inculcated, these advertising professional outlaws have really performed some therapeutic, as well as *moral*, wonders by its aid. While no honorable member of the profession can respect their pusillanimous claims as "discoverers" of a "new compound of oxygen," or can do otherwise than feel contempt for their cheap and vapid "home treatment" swindle, composed, as has been reliably shown, of inert solutions of the nitrates of lead and ammonium, my now somewhat extensive experience compels me to esteem nitrogen monoxide an essential adjunct in nearly all instances where oxygen is indicated. When I say that I scarcely treat a single chronic case without its aid, this admission is as strong evidence as I can adduce of my personal estimate of its value as a potent and essential modifier of pure oxygen.

Here, again, American enterprise has lagged, and foreign investigators have given us most of the accurate knowledge we possess concerning this gas. Its fame and excellence as a temporary anæsthetic have generally overshadowed any claims it has as a therapeutic agent. In fact, a fairly inexcusable degree of ignorance and misapprehension exists, on the part of the profession, concerning the chemical nature and physiological possibilities of nitrous oxide gas. Even by our foremost chemists it is assumed that anæsthesia produced by it is a true narcosis, a genuine asphyxia. Thus Dr. Squibb says (*Transactions New York State Medical Society, 1871*, p. 201): "A patient may, doubtless, be as effectually drowned by nitrous oxide as by water, and the resuscitation from partial drowning by it involves the same principle of treatment."

This assertion is a concise statement of the average estimate of the physiological relations of this gas.

With all deference to the generally dispassionate and proverbially accurate opinion of the eminent scientist who utters it, this estimate is wide of the truth, and utterly misleading. All modern dentists can refute it by daily experience, thousands of their patrons inhaling it, to

the extent of physiological saturation, as it were, without suffering from any of the usual sequelæ of asphyxia. On the contrary, the usually observed effects following its excessive exhibition, aside from the temporary anæsthesia produced, are those of pleasurable exhilaration and restfulness. There are no evidences that the blood of subjects caused to inhale even excessive quantities of this gas is poisoned, as by carbon dioxide or carbonic acid; therefore it remains to be shown that the nerve-centres are momentarily benumbed in some other way than by the toxic influence of this latter agent, or the non-aëration of the blood.

I have not hitherto found time, nor am I aware that any one has yet attempted to perform the necessary physiological test-experiments on the lower animals, which can evidently be made to set forever at rest this scientifically disputed but, empirically, already settled question.

Dr. Ziegler long ago insisted that this gas, being almost as good a supporter of combustion as pure oxygen, is capable, when inhaled into the lungs, of supplying oxygen to the animal system. My clinical experience with it certainly corroborates this estimate.

If it were, in fact, an asphyxiating agent, as so loosely taught, it is evident that its exhibition in unstinted quantities to literally hundreds of thousands of dental patients every year, would be far more frequently attended by disastrous sequelæ. As it is, the danger of a fatal result, even after the most careless and excessive exhibitions of it, in dental practice, to patients representing every possible degree of vital stamina, is immeasurably less than that represented by the buncombe lightning risk appended to some forms of fire insurance policies. It is practically nil, since an equal number of deaths would occur, in the same practice, from nervous shock, accidental anomalies—almost from old age.

To refute and correct this antiquated misapprehension, it is only necessary to quote an outline of its chemical nature and physiological properties from any authentic hand-book of chemistry, viz :

N_2O is a colorless, almost inodorous gas, of distinctly sweet taste. Its specific gravity is 1.525, a litre of it weighing 1.97172 gramme; 100 cubic inches weighing 47.29 grains. It supports the combustion of a taper or a piece of phosphorous with almost as much energy as pure oxygen; it is easily distinguished, however, from that gas by its solubility in cold water, which dissolves nearly its own volume. Mixed with an equal volume of hydrogen, and fired by the electric spark in the endosmometer, it explodes with violence, and liberates its own measure of nitrogen. Every two volumes of the gas must consequently

contain two volumes of nitrogen and one volume of oxygen, the whole condensed or contracted one-third—a constitution resembling that of the vapor of water. *If quite pure* (the italics are mine), or merely mixed with atmospheric air, it may be respired for a short time without danger or inconvenience. The effect is very transient, and is not followed by depression (Fownes.)

Those who have witnessed fatal cases of asphyxia from respiring “choke-damp,” or any other asphyxiating gas, need not be reminded that the rapidly fatal toxæmia of the latter agents, with the accompanying cyanosis, œdema, and distortions, is quite unlike any of the foregoing phenomena attending the use of nitrous oxide.

Of the millions of instances of its inhalation, even to complete saturation of the system, for dental and surgical purposes, how many have proved fatal, or even temporarily injurious? Surely not so many as have dropped dead while passing along the street, or sitting at table, or as have been smitten by lightning, during the same time.

Can such a record attach to so potent an asphyxiator as Professor Squibb would have us think is found in gaseous nitrogen monoxide?

Reverting to the several authorities briefly cited, it will be seen that, little by little, the meagre literature bearing upon the therapeutic possibilities of the oxygen group is being added to, and, in time, we shall not be without cumulative, as well as conclusive evidence, of a clinical character, in connection with this interesting subject.

The most serious drawback or hindrance to the rapid progress of this so-called oxygen treatment, which may be aptly styled the principal branch of natural therapeutics, based as it is on reason, physiology and clinical success, lies in the fact that, with our present facilities, or lack of facilities, its extensive clinical exhibition involves more time, care and cumbersome apparatus than a majority of practitioners can devote to it. It is for lack of the *required patience and pains-taking that so many experiments have failed, and will continue to fail, of satisfactory results.*

But facilities are being constantly increased and improved. Oxygen can now be had, condensed in rather unwieldy but portable iron flasks, containing 100 and 200 gallons each. Nitrogen monoxide has for years been available, in liquid form, in flasks of readily portable size; and several manufacturers are now giving us the peroxide of hydrogen in convenient form and of unexceptionable quality. The liquefaction of oxygen is also, at last, an accomplished fact; M. Cailletet having recently perfected a process and an apparatus of very simple character by which this result is easily attained. The process is

thus sketched: Ethylene is brought to the boiling-point in open vessels, producing a degree of cold represented by -123° C., or -253.4° F. At this point, oxygen assumes a liquid form, and may be stored in strong flasks. It ought not to be long ere we can procure this element at the counter of any well-stocked pharmacy in suitable vehicles for ready transportation and instant use.

A French mineral-water firm has begun to supply Paris dinner-tables with distilled water charged with oxygen. The beverage is mildly exhilarating, and likely to become popular. The idea was suggested by the favorable report of Dujardin Beaumetz to the Société Thérapeutique already referred to.

I shall be glad to assist in an advertising boom for the first American firm which shall have the enterprise to follow suit.

As an offset to the charge of enthusiasm and hobby-riding it may be pertinent to reiterate a few well known physiological and vital aphorisms:

"Oxygen is the sustaining principle of animal life and of all the ordinary phenomena of combustion.

"The process of respiration in animals is an effect of the same nature as common combustion. The blood contains substances which slowly burn by the aid of the oxygen thus introduced into the system. When this action ceases, life becomes extinct" (Fownes).

The biblical account of creation says, God breathed into his nostrils the breath of life (oxygen) and man became a living soul. Nor can animal life be maintained for a single hour without it. The first gasp of the new-born is for oxygen, and this instinctive and involuntary struggle continues, without a moment's cessation, at every step of the journey, from the cradle of infancy to the ever-open portals of "that pale realm from whose bourne no traveller returns."

Nine-tenths of all the curable diseases with which the human race is afflicted are the direct results of deprivation; they are genuine *toxicooses*. Each individual nurses within his own breast the poisoned arrow which finally slays him. All the habits, fashions, and tendencies of our modern civilization lead to physiological robbery, physiological semi-asphyxia. The poor are "hovelled and hustled together, each sex like swine," while the rich vie with each other in devising costly mausoleums in which to immolate themselves.

The race, as a whole, ekes out but half its possible days on earth for want of better air—oxygen. All the processes of animal life go on by the aid of, and are incessantly presided over by, this omnipresent and well-nigh omnipotent element.

It may be urged that the natural atmosphere contains the true normal and sufficient proportion of oxygen for human consumption. Granted, but what proportion of the human race, living under civilized conditions, is fortunate enough to experience even an occasional breath of "natural atmosphere," untainted by floating germs, smoke, dust, or nauseating odors? Even on the frozen summits of the Alps, Tyndall detected floating motes and impalpable impurities; while the air of towns and cities is constantly loaded with noxious, though often invisible, organic and septic particles. The mansions of the wealthy residents afford no immunity. The heavy carpets and soft upholstery furnish lurking lodgement for clouds of dust-particles, which every movement of occupants or air-currents sets afloat, to permeate every available cubic inch of the "natural atmosphere," in every room in the house. Even if those whose waning energies show the subtle but sure deterioration going on, be temporarily sent to the mountains or on sea voyages, they must spend much of their time in cramped and unventilated hotels or dwellings, or in the crowded cabins of noisome steamships, where no breath of "natural atmosphere" is ever tolerated.

Thus pages might be filled with apt and applicable illustrations from every-day life, to prove the necessity for, and adequacy of, an increased proportion of oxygen, in our efforts to overcome the disastrous results of evil influences and untoward surroundings which cannot be wholly escaped in any thickly settled community. Oxygen burns up waste, effete, and deleterious organic matters retained in the system, or taken into the lungs during respiration. It supplies to the blood and tissues one of the chief elements of nutrition. It dissolves and eliminates morbid deposits and infiltrations. It is the one purifier of the blood, *par excellence*. Hence, it is available in nearly every form of chronic disease, and in many acute conditions.

True, there are yet difficulties in the way of its general use, but there is no reason why enterprising practitioners, who are not already too severely overworked, or who are not too shiftless or indolent to incur the necessary preparation and pains-taking, should long be without facilities with which to avail themselves of this potent therapeutic agent. Its use has long enough been surrendered to advertising quacks. *It is time the regular profession rescued it from the smirch of charlatanry which has, to some extent, heretofore attached to it.*

CASES TREATED.—Continuing my numbers from previously published reports, I proceed with

CASE X. —Mrs. S. C——, aged forty-three; married; the mother

of four children, the youngest nine. In October, 1883, severe and repeated floodings came on, attributed by her to protracted overstrain, as a laundress, and to the approach of the menopause. The symptoms, however, were quite similar to those of an induced abortion. Pelvic cellulitis supervened, and was followed by a large psoas abscess, which developed slowly, accompanied with intense suffering, including paroxysms of sciatica, hysteria, and an endless host of neurotic disturbances. Omitting details and non-essentials, the abscess was opened February 8, 1884, and discharged two quarts of very fetid pus. Evidently it should have been opened a few days earlier: in fact, during my temporary absence at the meeting of the State Medical Society of that year; but the neighboring practitioner, in whose hands I left the case, either doubted my diagnosis or hesitated to operate until my return.

Phlebitis of the larger veins of the right thigh supervened, probably of pyæmic origin, and the right knee-joint became the seat of severe inflammation. Contraction of the muscles and tendons ensued, with great deformity and total inability to use the limb. Anorexia and vomiting were persistent, the patient became much emaciated and greatly depressed, and altogether the case was discouraging.

As soon as it was feasible (April 27th) she was placed on oxygen treatment. R. : O, N₂O, and common air, $\bar{a}\bar{a}$ 3 gallons, b.i.d.

May 10th.—General improvement is quite evident. The limb is less swollen and less painful, appetite returning. Treatment reduced to once daily.

May 20th.—Lameness very much better; she can get about the house without crutches and employs herself at housework.

June 10th.—Steadily gaining; does most of the housework for a family of eight. Appetite good. The limb is normal in size.

July 7th.—The improvement has steadily continued. Lameness nearly gone; appetite fairly voracious, and digestion excellent.

August 10th.—Lameness entirely gone. General health better than for some years, she having formerly suffered greatly from chronic dyspepsia. Treatment suspended. (Saw this patient September, 1885, rugged and well.)

CASE XI.—D. F. A—, a railway engineer, aged twenty-eight; single. Sent to me from a distant part of the State by his family physician. Father living, mother died of phthisis at thirty-eight. Says he has always been rugged with the exception of coughs and colds in Winter. Admits that he formerly lived a little "fast," and that he

had a touch of specific trouble several years ago. A homœopath "cured" two sores (chancres?) on the prepuce several times for him, the last one year ago. On the day following Easter, 1884, while at a circus, a profuse hæmoptysis occurred, suddenly and without warning. He was removed to the nearest physician's office, but bled so rapidly as to lose consciousness, and it was some hours before he rallied sufficiently to be carried home. Arrived here May 8, 1884.

May 9th.—Physical examination developed the following conditions: Figure slightly stooping; weight, 140; chest narrow and barrel-shaped; pulse, 110 and wanting in volume; temperature, 99.9°. On percussion find an area of dulness over the upper portion (not apex) of right lung, 5 × 5 inches. On forced expiration chest measures 30½ inches; on forced inspiration, 31¼ inches, showing an expansive capacity of only ¾ inch. Very loud tubular breathing over the right bronchus. Appetite capricious, the sight of an unsavory dish being sufficient to destroy it at any time.

Realizing the danger of recurring hemorrhages he is placed on a modified mixture of oxygen and nitrous oxide, well diluted with common air, and is cautioned against making any unusual effort when inspiring. Under this restriction he inhales four inspirations of 50 cubic inches each, b. i. d.

May 9th.—7.45 P. M.: pulse, 100. Four inspirations, as above, reduce the pulse to 92 *within two minutes*.

May 10th.—Pulse, 88, after treatment; respiration, 28.

May 11th.—5 P. M.; has just walked half a mile; pulse, before the inhalations, 117; after, 108.

Patient has heretofore been an inveterate smoker, consuming six or eight cigars of an evening. He is astonished to find his appetite for the weed entirely gone, and attributes it to three days' use of oxygen. As I have not before observed this result, further tests are necessary before announcing oxygen as a panacea for the tobacco habit! Dosage, 2 gallons, b.i.d.

May 14th.—Pulse, before treatment, 108; after, 102; and at the end of thirty minutes, 82.

May 16th.—Pulse, before inhaling, 81; after, 76.

May 18th.—Pulse, before treatment, 95; after, 85.

May 22d.—Chest measurements slightly increased, and he can now easily inspire 130 cubic inches at an effort. Can walk five or six miles at a stretch, without much fatigue, and feels very much encouraged. Eats and sleeps well. Pulse, before treatment, 82; after, 88; temperature, 99° F.

May 27th.—Pulse, before inhaling, 108; after, 94. To supply new material for the reparative processes evidently being inaugurated, I place him on Phillips' wheat phosphates, urging plenty of fresh beef, milk, mutton, eggs, and cream, with inunctions of cod-liver oil and glycerine three times a week, at night, to be followed in the morning by a hot bath, medicated with aqua ammonia and borax. He is also directed to imbibe half a pint of hot water before each meal, and at bed-time, daily.

May 31st.—Pulse, before treatment, 108; after three inspirations (five minutes), 96; temperature, 98.9°. There is a mild form of syphilide showing itself on the chest and back. Iodide of potash is added to his treatment, grs. x., t.i.d. Proportion of oxygen increased.

June 2d.—Pulse, before treatment, 84; after, 82; respiration, 24.

June 7th.—Before treatment, pulse, 86; after four inspirations, 84. Chest now measures 30½ and 32 inches, a gain of three-quarter inch in expanding capacity. Pulse-volume increasing. Dosage increased to three gallons, b.i.d.

June 20th.—Patient steadily gaining; can now inspire 150 cubic inches at an effort; chest measured on forced inspiration 32¼ inches. Dull area is smaller, and the vesicular murmur can be faintly heard over much of it. He can walk ten miles or more a day without fatigue. Treatment suspended, a pressure of Summer travel requiring him to return to his post, promising to return in the Fall. Weight, 145 pounds.

September 5th.—Returns, as per promise, weighing but 133 pounds. Has had no second hemorrhage. Pulse, 88; temperature, 98.8°. Chest measures 29¼ and 31 inches. Dry tubular breathing over right bronchus. The eruption is nearly gone.

October 1st.—Tubular breathing still distinct, but smoother. Area of dulness much smaller. Order Phillips' wheat phosphates with syr. pruni virg. and tr. nucis vom. Chest measures 29¾ and 31¾ inches. Temperature, 98.9°.

October 24th.—Dulness nearly gone. Eats and digests well. Pulse, 90, and quite full; temperature (8 P. M.), 99°.

November 27th.—Tubular breathing much less distinct. Pulse, 80; temperature, 99°; respiration, 20.

January 4, 1885.—Pulse, 93; temperature, 97.7°; respiration, 20.

February 19th.—Pulse, before inhaling, 98; after, 93.

March 10th.—Pulse, before inhaling, but after excitement, 104; thirty minutes later, after four inspirations, 96. Tubular breathing still audible, but vesicular murmur nearly as loud over the former dull area

as elsewhere. Respiration still a little hurried—20 to 22—higher after exertion; but patient eats and sleeps well, weighs 144 pounds, and feels competent to return to his occupation. Treatment suspended. Have heard from this patient during the past Summer, and always favorably.

CASE XII.—S. A. C——, merchant, age fifty-nine. Case of chronic rheumatism, severe dyspepsia, and slowly progressive locomotor ataxia. Oxygen treatment undertaken by means of a portable rubber bag, patient being confined to his bed, and completely helpless. Result of six weeks' treatment, gradual amelioration of all the symptoms. Locomotion became possible by the aid of a cane, and so remains at this writing.

CASE XIII.—Mrs. S. A. M——, aged twenty-six. Disease, severe, chronic, gastric catarrh. Complete recovery, and a gain of fifteen pounds in body-weight, in six weeks.

CASE XIV.—Mrs. H. A. E——, aged thirty. Case of unusually severe chronic constipation of ten years' standing. Family history shows phthisis, which has been both predicted and feared. Result of six weeks' treatment marked general benefit, which continues to date.

CASE XV.—Mrs. W. M. A——, aged fifty-five. An extremely severe case of chronic eczema, complicated with hay-fever and an undoubted *specific* taint. The true nature of the case having been disguised in the beginning, treatment was undertaken and pressed for six weeks, when only moderate benefit being apparent, beyond the relief of the hay-fever and accompanying indigestion, further treatment was refused, the patient being advised to go to the Hot Springs of Arkansas.

CASE XVI.—Dr. A. M——, aged fifty-five, came to me suffering from aggravated dyspepsia, with persistent constipation and distressing insomnia. Weight, 130 pounds. Has had inflammatory rheumatism, and one sister died of phthisis. Was placed on active oxygen treatment with nourishing diet—no drugs whatever—and in three weeks gained five pounds in weight, and had an excellent appetite. Constipation relieved and digestion good. Sleeps soundly, and has climbed to the summit of a neighboring mountain, nearly five thousand feet above the sea-level. Is to continue the treatment at home.

CASE XVII.—Mrs. H. W——, aged thirty-seven. Disease, chronic metro-peritonitis and subinvolution, with their usual train of feminine malconditions—dyspepsia, nervous prostration, hemicrania, cough, circumscribed "sore spot" under the left clavicle, etc. Percussion dulness over right apex, with exaggerated resonance over left

Is placed upon O sixty per cent., N₂O thirty per cent., diluted ten

per cent. Of this mixture, two gallons, b.i.d. The first inhalation produce marked sensations, viz, greatly accelerated respiration-rate, *without increasing the pulse-rate*; momentary partial anaesthesia; relief of prevailing migraine.

Mixture reduced to O twenty-five per cent, N_2O thirty-five per cent., diluted forty per cent., of which three gallons at a sitting, b.i.d.

At the end of one month's treatment she returns to her distant home, greatly relieved in every respect. Has gained a little in avoirdupois, more in vivacity; eats and sleeps well, climbs mountains, and has much less chest trouble. Has given up dying with "consumption," and has very little migraine.

CASE XVIII.—Dr. K. J——, aged forty. Has been a chronic sufferer from indigestion and "neurasthenia." In one month the indigestion is a thing of the past. He eats the miscellaneous fare of a well-kept hotel with impunity. Has gained five pounds in weight, and says he feels "rested," and much stronger. Can hunt, fish, and climb mountains without great fatigue. Says he feels physically "renovated," and returns to his practice with zest.

CASE XIX.—S. C. H——, aged thirty-seven; married; suffering from distressing dyspepsia, insomnia, and decline of virile power. After four weeks of active, but somewhat interrupted treatment, he declares himself a "new man." Was able to sleep soundly all night for the first time in two months after a single treatment—six inspirations. Now sleeps, eats, and digests well, and asserts that his virile powers are all that he could desire! In respect to this latter result, it was a surprise to me, but I have since noted the same revival in a very marked manner in a number of additional cases. The treatment has proved a prompt restorative to this function *in every case since observed* in which loss of sexual appetite and power, *in either sex*, had been a marked feature.

CASE XX.—Mrs. W. M. H——, aged forty-one; a good sample of the "lymph-albuminous" subject referred to by Bartholow. Very short of stature, but weighs 150 pounds. Family history shows hereditary tendency to phthisis, rheumatism, and insanity! Suffers from frequent attacks of arthritis and daily recurring "stupid spells," in which it is impossible to keep her from indulging in a lethargic sleep, varying in duration from half an hour to three hours. Subject also to a "bilious" form of indigestion, with "sour stomach," periodic vomiting, and prostrating headaches.

In this case treatment was irregularly and spasmodically followed

for several months, relieving the indigestion, and at the same time *reducing the body-weight ten pounds !*

She goes through the whole day without a "sleepy spell," the rheumatism yields with the aid of a little oil of wintergreen ; no vomiting, and no headaches. From being depressed and indifferent is now ambitious, active, and cheerful.

